GENETIC IMPROVEMENT OF AQUACULTURE PERFORMANCE FOR TETRAPLOID PACIFIC OYSTERS *Crassostrea gigas* AND PORTUGAL OYSTER *C. angulata*

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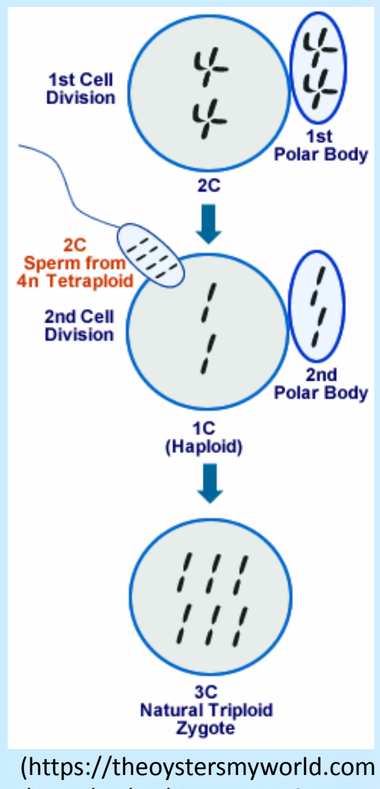
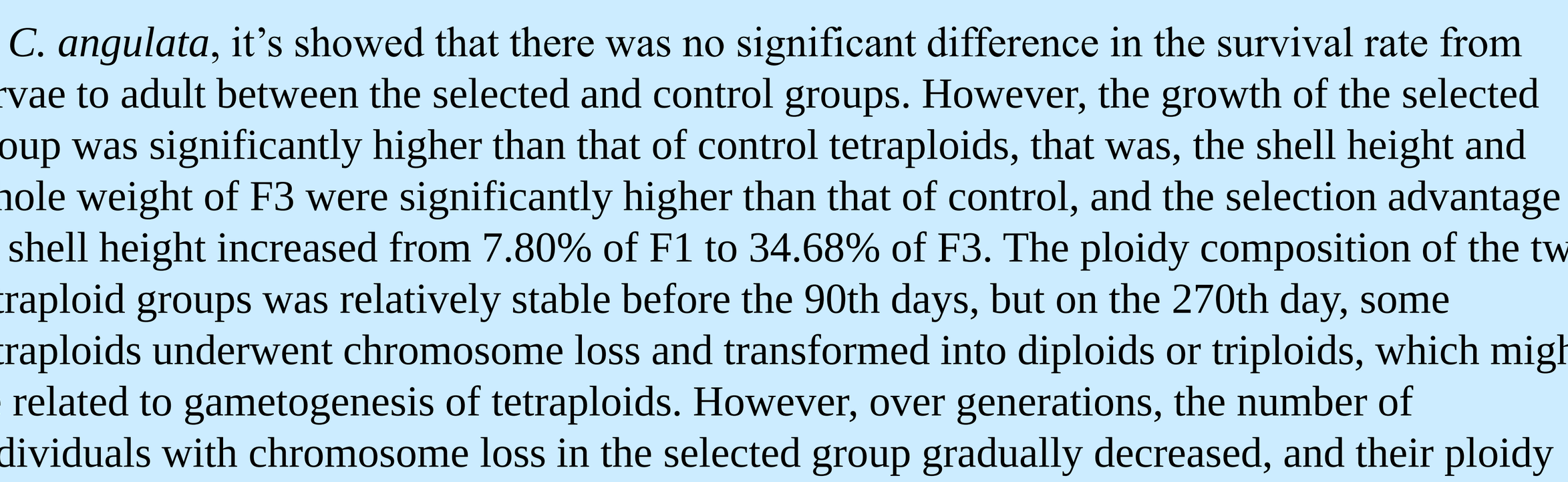
Tetraploid oysters play an important role in the global oyster industry, especially as the core germplasm for producing triploid oysters. So far, the genetic improvement of tetraploid oyster is poorly understood. The viability, growth, ploidy and fertility of the tetraploid progenies were evaluated through four and three consecutive generations of mass selection in *C. gigas* and *C. angulata*, respectively.



(https://theoystersmyworld.com/2012/04/12/the-story-of-triploid-oysters/)

In *C. gigas*, the viability of progeny has not been well improved, which is mainly affected by the quality of gametes. The growth traits of these progenies were signifycantly improved through mass selection over generations, similar to those of diploid oysters previous reported. The ploidy-level of tetraploid progeny differentiated and transformed into triploids, diploids, aneuploids, or mosaics in the early stage of gametogensis. Over generations, the proportion of tetraploid progeny increased significantly, and in the third generation (F3), the proportion of tetraploid reached more than 90%. Like diploid oysters, tetraploid progeny can undergo gonadal development to produce gametes and perform normal reproductive functions. Since the fourth generation (F4) have medium high heritability, further genetic improvement is feasible.

In *C. angulata*, it's showed that there was no significant difference in the survival rate from larvae to adult between the selected and control groups. However, the growth of the selected group was significantly higher than that of control tetraploids, that was, the shell height and whole weight of F3 were significantly higher than that of control, and the selection advantage of shell height increased from 7.80% of F1 to 34.68% of F3. The ploidy composition of the two tetraploid groups was relatively stable before the 90th days, but on the 270th day, some tetraploids underwent chromosome loss and transformed into diploids or triploids, which might be related to gametogenesis of tetraploids. However, over generations, the number of individuals with chromosome loss in the selected group gradually decreased, and their ploidy became more stable than that in control. In addition, both groups were fertile, with a sex ratio of more males than females and a proportion of hermaphrodite individuals.



Tetraploid individuals of *C. gigas* (left) and *C. angulata* (right)

In conclusion, the growth rate and tetraploid stability of the two selected tetraploid lines were significantly promoted in *C. gigas* and *C. angulata*, respectively, promising further selection progress and better utilization in oyster industry.